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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Frank Rothbrust

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EXAMINER

ROYSTON, ELIZABETH

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/587,728	<b>Applicant(s)</b> ROTHBRUST ET AL.	
	<b>Examiner</b> Elizabeth Royston	<b>Art Unit</b> 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 April 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 25-39 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/27/2006</u> .   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election of Group I, claims 1-24, in the reply filed on 4/13/09 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

1. Claims 25-39 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to nonelected inventions, there being no allowable generic or linking claim.

### ***Claim Objections***

1. Claim 1 is objected to because of the following informalities: The word "this" in the limitation "this shaped part" in line 10 should instead read as "said".

2. Claim 12 is objected to because of the following informalities: The use of the pronoun "it" renders the claim language indefinite. The limitation should instead read as "the infiltration substance".

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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4. Claims 1-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 1 is generally narrative and indefinite, failing to conform with current U.S. practice. Claim 1 appears to be a literal translation into English from a foreign document and is replete with grammatical and idiomatic errors.

4. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: 1) forming a powder containing oxide ceramic and 2) infiltrating the crystalline oxide ceramic shaped part with the infiltration substance.

5. With regard to claims 1, 3, 17, and 19: A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd.

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App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance:

Claim 1 recites the broad recitation "precursor of a silicate glass", and the claim also recites "hydrolysable silane" which is the narrower statement of the range/limitation.

Claim 3 recites the broad recitation "an ethylenic wax material", and the claim also recites "ethylenic wax, polyvinyl resin, polyvinyl pyrrolidone, polyvinyl acetate, polyvinyl butyral, and/or cellulose" which is the narrower statement of the range/limitation.

Claim 17 recites the broad recitation of any pressure, and the claim also recites "at ambient pressure" which is the narrower statement of the range/limitation.

Claim 19 recites the broad recitation "subjected to a further heat treatment", and the claim also recites "subjected to a further heat treatment after application of the one-layer coating" which is the narrower statement of the range/limitation.

6. Claim 20 recites the limitation "partial sintering" in line 3. There is insufficient antecedent basis for this limitation in the claim. For purposes of examination, "partial sintering" is interpreted to mean the "pre-sintering" step in claim 1.

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1, 4, 5, 8-15, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glass (US PN 5478785).

With regard to claim 1, Glass teaches a process for producing an inorganic-inorganic composite material in which after shape-imparting processing (col. 7, line 15-17; figure 1) and pre-sintering (col. 7, line 20-21) of a powder containing an oxide ceramic, an open-pore, crystalline oxide ceramic is created (col. 7, line 21-23). The ceramic shape is then infiltrated with a hydrolysable silane precursor (col. 7, line 31-33)

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at room temperature (col. 4, line 45-47) followed by sintering to a density of at least -- 99.5% (col. 4, line 59) at a temperature from 1000-1600°C (col. 7, line 37-38, 40, 45-49) in air (col. 6, line 46; col. 7, line 38). Although Glass does not explicitly state sintering at ambient pressure, Glass teaches the sintering process occurs in air (col. 6, line 46; col. 7, line 38), indicating atmospheric conditions. Furthermore, Glass does not make any mention to a vacuum or other pressure affecting device, or provision for a change in pressure during sintering. Therefore, since the use of a vacuum or other pressure affecting device would require the increased complexity of the system in addition to adding considerable cost, the Examiner interprets the teaching of Glass to be at ambient pressure.

Glass does not explicitly teach an infiltration time of less than 10 minutes; however, Glass does show a direct relationship between desired infiltration depth and infiltration time (col. 5, line 9), which establishes the infiltration time as a result effective variable. It would have been obvious to one having ordinary skill in the art at the time the invention was made to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See *In re Boesch*, 205 USPQ 215.

With regard to claim 4, Glass teaches pre-sintering at 600 to 1300°C (col. 7, line 20, 25-26).

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With regard to claim 5, Glass teaches an optional in vacuo infiltration (col. 3, line 49).

With regard to claims 8, 11-12, although Glass does not specifically teach an infiltration layer thickness of 10 to 90% of the pre-sintered open-pore crystalline oxide ceramic thickness, Glass teaches that the infiltrate layer thickness is dependent only on time (assuming consistent pore size in the pre-sintered ceramic and viscosity of the infiltrate), in a known relationship (col. 5, line 9). Therefore, the layer thickness of the infiltrate relative to the thickness of the preform is dependent only on the initial size of the preform and the calculated time of infiltration. It would have been obvious to one of ordinary skill in the art to adjust the time of infiltration so that the layer thickness was between 10 to 90% of the thickness of the pre-sintered open-pore crystalline oxide ceramic.

With regard to claims 9 and 10, although Glass does not specifically teach an infiltration layer thickness between 5 and 20% of the sintered composite material, Glass does teach shrinking of the composite upon sintering (col. 5, line 34-39). It would have been obvious to one of ordinary skill in the art at the time of the invention that if the infiltrated preform of claim 8 was sintered in the same environment as the instant claim 1, then the final sintered composite would have an infiltrate layer thickness from 5 to 20% of the sintered composite material.



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With regard to claims 13-15, Glass teaches a polar water solvent (col. 7, line 31-33).

With regard to claim 22, Glass teaches shape-imparting processing into the “required size and shape” (col. 7, line 15-17), including monolithic blocks (the porous alumina preform in the upper left corner of figure 1).

11. Claims 2, 3, 16, 17, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glass (US PN 5478785) as applied above for claim 1 and further in view of Tyszblat (US PN 5447967).

With regard to claims 2 and 3, Glass does not specifically disclose the use of an organic binder.

Tyszblat teaches several possible organic binders in the oxide ceramic powder, including cellulose (col. 2, line 24-33).

It would have been obvious to one of ordinary skill in the art to use the binder taught by Tyszblat in the ceramic taught by Glass. The rationale to do so would have been provided by the motivation found in the teaching of Tyszblat, that to use an organic binder predictably provides a means to fix the shape of the shaped ceramic perform (col. 1, line 41-44).

With regard to claims 16 and 17, Glass does not specifically disclose machining prior to infiltration or after sintering.

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Tyszblat teaches machining prior to infiltration (col. 3, line 42-43) and post infiltration/sintering (col. 3, line 59-60). Although explicit mention of the pressure when machining the product (col. 5, line 13-16) is not made by Tyszblat, the applied vacuum is only discussed when the product is held at higher temperatures (col. 3, line 49-52). Once the product cooled it would have been obvious to one of ordinary skill in the art at the time of the invention to remove the product from the vacuum and to perform any subsequent machining/polishing at atmospheric pressure, as to do otherwise would generate additional complexity in the process.

It would have been obvious to one of ordinary skill in the art at the time of the invention to machine the ceramic prior to infiltration and after infiltration. The rationale to do so would have been provided by the motivation found in the teaching of Tyszblat, that to shape the un-infiltrated ceramic predictably enables a better fit for the ceramic as an artificial tooth (col. 2, line 65-68; col. 3, line 11-13) and to shape after sintering predictably allows for the removal of excess material (col. 3, line 59-60).

With regard to claims 20 and 21, Glass does not explicitly disclose an oversize of 15 - 30%.

Tyszblat teaches the removal of material to shape the perform to the desired configuration (col. 3, line 42-43; col. 3, line 59-60).

Tyszblat does not explicitly disclose a specific oversize for the product at any step; however, it would have been obvious to one of ordinary skill in the art at the time of the invention to include sufficient oversize in the initial preform such that the desired

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final shape and size of the product can be achieved through machining by removing product (i.e. sandblasting col. 5, line 13).

12. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glass (US PN 5478785) as applied above for claim 1 and further in view of Kondo (US PN 4626392).

With regard to claims 18 and 19, Glass does not explicitly disclose attaching at least a one-layer coating of a further material to the surface of the composite material or subjecting the layered composite and further material to heat treatment.

Kondo teaches attaching an additional layer of a further material to the surface of the composite material and subjecting the layered composite and further material to heat treatment (col. 3, line 55-62).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the additional layers taught by Kondo to the process for making a composite material taught by Glass. The rationale to do so is the motivation provided by the teaching of Kondo, that to include the layer of a further material predictably produces ceramic materials suitable for surgical implantation (col. 3, line 50-53).

13. Claims 23 and 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Glass (US PN 5478785) as applied above for claims 1 and 22 and further in view of Tyszblat (US PN 5447967) and Franek (US PN 4830655).

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With regard to claims 23 and 24, Glass does not specifically disclose chip-forming machining of the monolithic block before applying the infiltration substance under vacuum.

Tyszblat teaches applying the infiltration substance in vacuo (col. 3, line 50-52) after shaping with machining (col. 3, line 42-43).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the vacuum infiltration taught by Tyszblat in the process taught by Glass. The rationale to do so would have been found in the motivation provided by the teaching of Tyszblat, that to infiltrate under vacuum predictably results in the successful infiltration of a porous material with glass (col. 3, line 44-52).

Glass in view of Tyszblat does not explicitly disclose chip-forming machining.

Franek teaches chip-forming machining for the cutting of Al and Zr oxide materials (col. 4-5, line 66-68, 1-3).

It would have been obvious to one skilled in the art at the time of the invention to use of the chip-forming machining taught by Franek in the machining step taught by Glass in view of Tyszblat. The rationale to do so would have been the motivation provided by the teaching of Franek, that to use such machining and polishing techniques will predictably give fine surfaces on Al and Zr oxides (col. 1, line 46-49).

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth Royston whose telephone number is 571-270-7654. The examiner can normally be reached on M-Th 8:00am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/E.R./  
Patent Examiner, GAU 1791

/Christina Johnson/  
Supervisory Patent Examiner, Art Unit 1791